Klamath National Forest
Best Management Practices

REGION 5
EVALUATION PROGRAM
WATER QUALITY
MONITORING REPORT
2007 Fiscal Year

Evaluation of Forest Service administered projects including timber sales, roads, grazing, prescribed fire, mechanical mastication, recreation sites, and common variety minerals activities.

www.fs.fed.us/r5/klamath/projects/forestmanagement/forestplan/reports/resourceplanreports/final-07bmp-report.pdf

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KLAMATH NATIONAL FOREST
2007
BEST MANAGEMENT PRACTICES (BMP)

SUMMARY

Fiscal year 2007 was the sixteenth year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest (Forest) and the Forest Service Pacific Southwest Region (Region). This program is designed to evaluate how well the Forest and the Region implement BMPs and how effectively the BMPs control water pollution from National Forest lands. Onsite evaluations have been divided into 29 possible "activity groups" (categories) that look at related management practices. In 2007 fiscal year, Klamath National Forest staff evaluated timber, engineering, fire, range, recreation, minerals, and vegetation manipulation projects to determine whether BMPs were implemented and effective. Seventeen different protocols were used to evaluate a total of 56 sample sites. Each protocol is designed to measure implementation and effectiveness of an activity category that includes from one to six related BMPs. Appendix A is a table that cross-walks each protocol/activity category alpha-numeric code with its name and the BMPs it is designed to monitor.

The Forest's BMPEP is composed of two sampling strategies. The first is the evaluation of randomly sampled sites, where data are collected and entered into a Regional database. The second strategy is non-random monitoring, in which sites are selected based on management interest in specific ongoing projects. These sites are often evaluated concurrently ("real time") and can be qualitative as well as quantitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment; however, the in-channel construction protocol requires at least one sample per site to be done during the active project phase. The site evaluations followed protocols described in *Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide* (USDA, Forest Service, 2002). The random samples were selected from a pool of eligible sites. In cases where the sample pool is very small, either all eligible sites are evaluated, or selection is done in a way that does not bias which sites are selected. The results of the random and non-random evaluations are summarized here.

Randomly sampled sites: In 2007, 57 sites were randomly drawn from Forest activity pools and each was reviewed for BMP implementation and effectiveness. Timber (17 sites), road engineering (22 sites), recreation (4 sites), grazing (5 sites), vegetation manipulation (3 sites), fire (5 sites) and mining operations (1 site) activities were evaluated. Sites were located on all Ranger Districts (Oak Knoll, Happy Camp, Salmon River, Scott River, and Goosenest). One of the recreation sites was evaluated, but will be reported in the 2008 annual report, once the software problems explained on page 3 have been resolved. Thus, the results of 56 site evaluations are reported in the 2007 report.

BMP Implementation was evaluated to determine whether: (1) we did what we said we were going to do to protect water quality; and (2) project environmental documentation and/or contract/permit language was sufficient to ensure water quality protection. BMP effectiveness was evaluated to determine if water quality protection measures met objectives. The objective for meeting most evaluation criteria is keeping all sediment out of channels and near-channel areas. Sediment deposition presence, volume and proximity to the nearest watercourse were used to indicate level of effectiveness.

Table 1 summarizes the results of the BMP Random Site Evaluation Program for 1992 through 2007. Sites that partially meet evaluation criteria are not tallied in the "fully successful" group.

Table 1. BMP Random Site Evaluation Program from 1992 through 2007.

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		# of Sites	% of Total Fully Successful	# of Sites	% of Total Fully Successful
1992	53	29	55%	43	81%
1993	77	61	79%	72	94%
1994	52	39	75%	46	89%
1995	77	64	83%	74	96%
1996	57	48	84%	56	98%
1997	60	60	100%	59	98%
1998	61	38	62%	30/35	86%
1999	38	25	66%	34	89%
2000	45	40	89%	43	96%
2001	64	56	88%	61	95%
2002	53	49	92%	47	96%
2003	51	51	80%	45	90%
2004	53	50	94%	53	100%
2005	48	46	96%	47	98%
2006	45	42	93%	45	100%
2007	**56**	**56**	**100%**	**55**	**98%**

In 2007, BMPs were fully implemented at 100% of the sites evaluated and effective at 98% of the sites evaluated (water quality was not protected at one site where BMPs were fully implemented). This represents a small change in BMP implementation (7% increase) and slight change in effectiveness (2% decrease) compared to 2006. Dividing the years 1992-2007 into three 5 to 6-year groupings makes the evaluation trends more apparent. Table 2 shows the improvements made in BMP Implementation and Effectiveness through time.

Table 2. Implementation and Effectiveness success rate through time.

5-6 Year Increment	Average Implementation Success Rate	Average Effectiveness Success Rate
1992-1996	75%	92%
1997-2001	81%	93%
2002-2007	93%	97%

Actions taken in 2007 led to improvements in in-channel construction and grazing practices to solve problems identified in the 2006 annual report. Difficulty with BMP Implementation and/or Effectiveness had plagued "In-Channel Construction" (Activity Group E13; Table 3) over the previous 5 years; however, in 2007 all four E13 sites met both implementation and effectiveness criteria. BMP evaluations indicate R30 (Dispersed Recreation Sites) and M26 (Mining Operations) both have had implementation problems 2 out of the last 6 years. None of the sampled sites in these two categories had problems in 2007, although R22 (Developed Recreation) had Oracle database scoring problems. There is a fix being pursued, as mentioned under Adaptive Management.

BMP evaluation G24 Grazing has had effectiveness problems in 2 of the last 6 years; however, in 2007 all 5 sites met implementation and effectiveness criteria. Errors with automatic scoring by the Oracle software were fixed by the Region in 2007. Results for 2005 and 2006 were recalculated after the fix was applied, and it was determined that sites that been previously scored as a "failed" outcome actually passed. There was one sample in each year.

Table 3. BMPs with Implementation and Effectiveness problems over the last 6 years.

BMP	No. of years with Implementation Problems	No. of years with Effectiveness Problems
E09	1	1
E10	1	1
E11	1	0
E13	**4**	1
E14	1	1
E16	1	1
R22	2	2
R30	**2**	0
G24	0	0*
M26	**2**	1
M27	0	1

*The number was 2 in the 2006 BMP Summary; Table 2. The current value shows results of recalculation following repair of Oracle software glitch.

Non-Randomly sampled sites: Several sites were selected for concurrent monitoring because the activities and their proximity to watercourses pose a potentially high risk for sediment discharge. These sites are not included in the numeric summaries in Tables 1, 2 and 3. They are discussed in the Non-Random Site Results summary section.

The 2007 BMP monitoring report suggests how to continue the trend of improved success by ensuring proper implementation and further refining BMP effectiveness.

2007 BMP MONITORING REPORT

INTRODUCTION

On-site evaluations are the core of the BMP Evaluation Program. Such evaluations are necessary to meet the requirements of a Management Agency Agreement between the Region and the State of California. There are 29 different evaluation procedures designed to assess a specific practice or set of closely related practices. Though the evaluation criteria vary based on the management activity, the evaluation process is similar. The Regional Office annually assigns the type and number of management activities to be evaluated on each Forest. The specific sites for each evaluated management activity are randomly selected from Forest project pools. Statistical analyses are periodically performed from the collective Regional data, and annual reports of Region wide BMP implementation and effectiveness are presented to the State and Regional water boards.

The criteria for sample pool development are Regionally standardized by activity type and described in the BMPEP User's Guide (2002). Some minor changes in the forms for E10 (road decommissioning) and G24 (grazing) forms resulted from field protocol testing on the Forest in 2005.

In addition to the random sample sites, projects are selected that are of management interest with regard to timely water quality protection implementation. Evaluation of these non-randomly selected sites is often called "concurrent" BMP monitoring because it is accomplished while the project is actively operating. Feedback is immediate and remedial action can be taken. However, comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter season to test the protection measures. Besides the BMPEP, contract compliance monitoring is done concurrently, and assesses BMP implementation along with other project resource protection measures.

BMP monitoring strives for an interdisciplinary evaluation of projects and actively involves project proponents and watershed personnel. This interdisciplinary effort provides direct feedback to the project proponent on how well the BMP was implemented and allows for adaptive management on future project designs.

Earth scientists Juan de la Fuente, Tom Laurent, Roberta Van de Water and William Snavely, along with District project leaders conducted the 2007 BMP evaluations.

2007 PROGRAM OVERVIEW AND METHODS

Randomly Sampled Site Monitoring

The following is a breakdown of the type of activities sampled on timber, engineering, fire, range, recreation, minerals, and vegetation manipulation projects:

Timber
Timber Activities that were sampled that fell into the following activity groups:
Streamside Management Zones (T01), Skid Trails (T02), Suspended Yarding (T03), and Landings (T04). Five projects were sampled on two Districts.

Engineering
The following activity groups were sampled: Road surfacing, drainage and protection (E08), Stream Crossings (E09), Road Decommissioning (E10), Control of Sidecast Materials (E11), In-channel Construction Practices (E13), Temporary Roads (E14), Water Source Development (E16), and Restoration of Borrow Pits and Quarries (E19). A total of 11 projects distributed across 4 Districts were sampled.

Fire
One Activity Group, Prescribed Fire (F25), was monitored on 3 projects, each on a different District.

Range
One Activity Group, Range Management (G24) was evaluated at five separate range allotments on three Districts.

Recreation
These two activity groups were evaluated: Developed Recreation (R22) and Dispersed Recreation (R30). A total of 3 sites were sampled on three Districts.

Minerals
One activity group, Common Variety Minerals (M27), was evaluated at one sample site.

Vegetation Manipulation
One activity group, Vegetation Manipulation (V28), was measured at two mastication project sites and one tractor piled site on two Districts.

Data collection methods are specific for each BMP activity group and are described in the BMPEP User's Guide (USDA, Forest Service, 2002). One Forest modification is that BMP evaluations which require soil cover monitoring use the Forest's soil cover monitoring procedures developed in 1998.

Data gathered for each BMP are used to answer specific questions on BMP evaluation forms. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) to be evaluated must: 1) be implemented under a NEPA decision; 2) adhere to contract requirements; and 3) have been completed at least one but not more than 3 winters prior to evaluation. In-channel construction BMP evaluations (E-13) are conducted during the activity and immediately after completion.

The timber, silvicultural and engineering project sample pools were developed from a list of closed timber sales. Decommissioned road samples were taken from the Forest-wide Decommissioned Roads Database. The prescribed fire sample pool was developed from a list of completed prescribed fire projects. The recreation sample pool included all known developed and dispersed recreation sites on the Forest. The grazing sample pool was a list of active grazing allotments on the Forest.

Non-Randomly Sampled Site ("Concurrent") Monitoring

Data collection was similar to that used for randomly sampled sites; however, some data may be more qualitative than those collected using the strict Regional protocol. Often the same forms are used, but data are not entered into the database or numerically scored. Narrative reports often present or supplement the evaluation. The primary difference between concurrent and randomly selected sites is that typically no significant runoff has occurred since project implementation.

SUMMARY OF RANDOM SAMPLING RESULTS BY ACTIVITY GROUP

Timber Activities

T01 Streamside Management Zones (4 sites)
Two harvest units (#30 and 52) were reviewed from the Jack Conventional Timber Sale and one unit (#2) on Hi You Timber Sale, all on the Scott River Ranger District. In addition, Unit 16 on Goosenest LSR Project on Goosenest District was reviewed. All streams monitored for protection zones were well-buffered by layout of the units. **All four of the sampled SMZs met BMP implementation and effectiveness evaluation requirements.**

T02 Skid Trails (2 sites)
Randomly selected skid trails were evaluated within two ground-based yarded harvest units (#1 and 2) in the Saddle Timber Sale on Goosenest Ranger District. The water bar failure rate was 0%. **The skid trails met all evaluation criteria for BMP implementation and effectiveness.**

T03 Suspended Yarding (4 sites)
Four units were reviewed in the Jack Conventional Timber Sale (Units 22, 35, 370, and 511) on Scott River Ranger District. **Each unit met project BMP and contract requirements and BMP effectiveness criteria.** None of the corridors had rills present and, for three of the four units, "very little ground disturbance from logs" was noted. In every unit, measured ground cover ranged from 85-94%, which exceeded objectives that ranged from 60-80%, depending on the site.

T04 Landings (7 sites)
Seven log landings were reviewed in the Jack Heli Timber Sale on Scott River District. **All met project BMP and contract requirements.** This included waterbars and/or outsloping of the surface, which were observed to effectively disperse runoff. On a landing off the end of 41N16 B, evidence could be seen of rilling on the landing surface (>1 rill/20') as well as concentrated flow and rilling and deposition beyond the toe of the fill. The runoff had entered the landing from above. The remedy recommended after the BMPEP field visit was to construct a rocked spillway with a silt fence in order to prevent gullying. The degree of water quality impact was rated as "Insignificant", with the extent being the smallest category, while the duration was estimated to last more than 1 season. There was also evidence of concentrated flow on a landing in Unit 165 and one other landing which had minor rills present.

Similarly, rills were evident that did not extend more than the length of the slope below the toe of the fill. The landings with rills met the standard implementation practices and were fully effective at dispersing drainage, controlling erosion and sedimentation, in spite of the isolated problems. **The log landings met evaluation criteria for BMP implementation and effectiveness.**

Road Engineering Activities

E08 Road Surface, Drainage and Slope Protection (3 sites)
Road reconstruction and/or maintenance were evaluated on three roads (15N27, 38N04.3, and 46N61) on three different projects. **All three sites fully met BMP implementation and effectiveness requirements.** Project-specific details follow.

Road 15N27 was maintained on a road on Happy Camp District that was stormproofed in 2002 and then had maintenance done in 2006 consisting mainly of blading. The 2006 work was the subject of this evaluation. All implementation and effectiveness criteria were met. In February 2007, an interdisciplinary field review of the road condition revealed a large landslide. In summer of 2007 a repair design was developed by the Forest Geologist and Forest Geotechnical Engineer to address long term slope stability. This work will require environmental planning and securing a funding source prior to implementation.

Road 38N04.3 underwent maintenance in 2006 as part of a timber sale contract, Taylor Fuels Reduction Project. This road on Salmon River District had also had a prior stormproofing project. **Both the reconstruction and maintenance project met all implementation and effectiveness criteria.**

Road 46N61 on Oak Knoll District underwent maintenance in 2006 following fire suppression which utilized the road. **Very little erosion is evident and all implementation and effectiveness criteria were met.** Although fill failure risk is not affected by the projects evaluated nor was it applicable to the E08 BMPs, opportunities were identified during the field review to reduce fill failure at draw crossings. Further detail can be found on the field notes for this sample in the 2007 BMPEP binder located in the Supervisor's Office.

E09 Stream Crossing (4 sites)
Three of the four road-stream crossing sites were on same projects as for E08. The crossings occur on roads 15N27, 15N32, 38N04.3, and 46N61 on Happy Camp (1st two), Salmon River, and Oak Knoll Districts, respectively. **All four sites passed the evaluation criteria for Stream Crossing Protocol implementation and effectiveness.** Project specific details follow.

Road 15N27 - The crossing had undergone maintenance in 2006, consisting mainly of blading, which "resulted in little if any erosion." Regarding the 2002 stormproofing, the observer noted that most crossings received good long term protection from potential diversion during storm events.

Road 15N32 maintenance met stream crossing BMPEP criteria. The documentation noted "little evidence of erosion observed associated with maintenance."

Road 38N04.3 – The 2006 maintenance associated with Taylor Fuels Project met all stream crossing criteria.

Road 46N61 – The post-fire maintenance met all criteria with "little erosion observed." Although crossing fills were not affected by this 2006 maintenance, a long term opportunity was identified to reinforce some of the fills at channel crossings with a future stormproofing project. (The fill construction project pre-dated the maintenance work.)

E10 Road Decommissioning (4 sites)
Two sites were decommissioned in 2000 and two sites were decommissioned in 2002. 48N33 Hungry Creek, and 41S22 Long John were decommissioned in 2002, 45N75 Tompkins and 18N17 East Fork Indian in 2000. At that time the standard design practice called for leaving some residual fill in stream crossings. The design practice has been evolving toward minimization of fill volume left on site and that has since become standard practice. See adaptive management discussion. For each case, project-specific notes follow.

Road 18N17 – One feature of interest in this evaluation is a treated timber wall that was removed, while leaving the associated geogrid in place. No erosion was evident from storms during the five winters since removal. During the evaluation, some erosion was noted, but this may have been associated with a 1997 debris flow and not affected by the project itself. Several recommendations were made but the 18N17 decommissioning project met all implementation and effectiveness criteria. See the Adaptive Management discussion for details.

Road 41S22 – Fills removed from the larger channels were laid back to <65% sideslope, enabling vegetation to become well-established with little erosion observed. Good rock armoring was seen on the two larger crossings. As with the previous site, the observer noted that the project specifications were followed. This allowed for some fill to be left in smaller draws. Little erosion has occurred at those sites to date. **BMP implementation and effectiveness criteria were met.**

Road 45N75 – This 3 mile road was decommissioned in 2000. Three stream crossings that were removed near the end of the road were evaluated. Pipes were removed according to specification. Some original debris catchment structures were left in place, including a culvert. Otherwise, channel alignments were configured to closely match the natural channels. **BMP implementation and effectiveness criteria were met.**

Road 48N33 –The alignment of the decommissioned segment parallels Hungry Creek. The decommissioning design left the road with the eroded-away prism where the stream now flows. The segment is all on erodible granitic terrain. **All criteria for implementation and effectiveness were met.** Decommissioning earthwork was limited to both ends of the road, since the central part of the alignment is coincident with a segment of the Hungry Creek channel. The stream has a wide floodplain in this area, and in 1997, the channel took a course directly down the road alignment, qualifying it for ERFO. The planning team evaluated the road, and decided to decommission the two ends of the road, and leave the channel in its new alignment.

E11 Control of Sidecast Material (2 sites)
Two of the roads evaluated for E08 and E09 were also evaluated for E11. Both maintenance projects fully met BMP Implementation and Effectiveness requirements to control sidecast.

Road 15N27 – There was one minor exception in an effectiveness criteria ("sidecast into vegetative slopes") where "very minor inadvertent sidecast" was noted by the observer. **It still qualified for all criteria according to the protocol.**

Road 38N04.3 – Road fills were well-vegetated with no evidence of sidecasting during maintenance. **BMP implementation and effectiveness criteria were met.**

E13 In-Channel Construction Practices (4 sites)
Individual sites, rather than entire road segments, comprise the sample pool. In 2007 all four available sites in the pool were sampled. The protocol requires pre-, active-, and post-project observations. For the 2007 sites, these observations were approximately 1 month apart. Unlike the other random site evaluations reported on in 2007, post-project does not mean post-winter but is done immediately following project completion. The four sites fully met all BMP Effectiveness and Implementation requirements. The first three sites were in the same project, and discussed in the following paragraph.

Indian-Horse ERFO project – **46N50 lower wall site**, **middle wall site**, and **upper wall site** all were fully implemented and effective. The site was carefully designed and constructed to protect channel integrity, water quality and aquatic habitat. The design had to consider the challenges of an existing road prism that is located partly in a good size active stream channel (Horse Creek). The criteria, including turbidity and changes to substrate fine sediment downstream of the site were met.

47N65 crossing replacement – In this project, a washed out bridge was replaced with a vented rock ford. The site is located on private land on a coop road, so the work was done through a cost-share agreement. It was designed and constructed using Forest Service force account manpower. The site is located in a debris flow-prone channel with a steep gradient and unconsolidated bed material. The design was developed considering the physical challenges of the site, and future water quality protection needs. Construction was carefully executed to minimize disturbance, thus meeting E13 evaluation criteria.

E14 Temporary Road Construction (1 site)
This site was on Taylor Fuels Reduction Project on Salmon River Ranger District. The temporary road was built to access units 15 and 19. The road is now closed. The field reviewer noted that the road has permanent culverts at streams and should therefore be evaluated by the District for decommissioning (which would remove pipes), or for upgrading and adding the road to the system. Very little erosion was observed and no sediment was being delivered to the streams; however, Bark Shanty Creek has a smaller capacity pipe than the one upstream on another road. The observer also mentioned there is the potential for unauthorized users to gain access with minimal chainsaw and shovel work. **All project BMP Implementation and Effectiveness requirements were met.** Further discussion can be found under Adaptive Management.

E16 Water Source Development (1 site)
The site was on Jack Heli Timber Sale on Scott River District. **It met all BMP implementation criteria but not all effectiveness requirements for BMP 2.21.** The criterion not met is "no discernable difference in channel substrate or morphology above and below development, since some sand is captured in the impoundment hole. The reviewer also noted that while no serious erosion was occurring,

a minor amount of rilling on the fill below the road where running down the road goes into the stream. He recommended that reshaping be done to prevent long term problems such as rill erosion at this tanker fill site on 41N16.3, and that once the project is complete, the small (4' high) rock dam and sand accumulated behind the dam be removed.

E19 Restoration of Borrow Pits and Quarries (1 site)
The site is Smith Hill Quarry on Scott River Ranger District, restored in 2006 but currently open. **All requirements for BMP Implementation and Effectiveness were fully met for this quarry.** The reviewer noted that the bench road had not been waerbarred as is standard practice; however, due to the all-rock surface, no sediment transport is expected to occur.

E20 Management of roads during wet periods - see non-random sites.

Recreation Activities

R22 Developed Recreation Sites (1 sites)
A developed recreation site was evaluated, Juanita Lake Campground, on Goosenest Ranger District. **Juanita Lake Campground met all BMP implementation and effectiveness criteria, exceeding the ones for ground cover, streamside management zone protection (i.e. of the lake), and fish cleaning facilities.**

R30 Dispersed Recreation Sites (2 sites)
Two dispersed recreation sites were visited, Chambers Creek River Access on Happy Camp Ranger District, and Gottville River Access on Oak Knoll District. **Both sites met all BMP implementation and effectiveness criteria.**

Range Management Activities

G24 Range Management (5 sites)
Two range allotments on Scott River District, two allotments on Goosenest Ranger District, and one on Oak Knoll District were sampled. Samples were taken at long term condition and trend reference sites. Range conditions indicated drought effects and therefore vulnerability to grazing damage; however, proactive measures were generally taken by the Districts and permittees to prevent overutilization. Herbaceous and woody utilization standards were met at all sites. The G24 streambank alteration measurement protocol was followed for each effectiveness evaluation; however, the Forest Plan contains no streambank alteration standard and guideline against which to accurately gauge implementation. Table 1 gives the effectiveness rating for each sample site for this criterion, according to the BMPEP form. Recommendations were made for the two allotments where samples indicated less than 80% stable streambank observed. (See Table 4 and adaptive management discussion.) All sites received the highest floodplain erosion and riparian vegetation criteria rating, with one minor exception. **Overall, all sites passed the implementation and effectiveness requirements.**

Table 1 – Summary of Bank Stability ratings for range management samples

Allotment and District	Pasture Unit	Bank stability rating per G24 form		
		>80% stable	70-80% stable	<=70% stable
Shackleford, Scott River	Log Lake Meadow			x
South Fork/Eagle Creek, Scott River	Upper Eagle Creek Meadow	x		
South Klamath, Oak Knoll	Cedar Flat	x		
Ball Mountain-Kuck, Goosenest	Upper Unit	x		
Haight Mountain, Goosenest	Antelope Creek		x	

Fire Management Activities

F25 Prescribed Fire (5 sites)

Three prescribed burn units were sampled on the Goosenest Ranger District, all on Hill 23 Underburn Project. One unit was sampled on the Timber Gulch Underburn on Salmon River Ranger District, and one was sampled on the Homestead Underburn on Happy Camp District. **All five met BMPEP implementation and evaluation criteria.** Table 2 shows a comparison of the measured values vs. the project objectives for ground cover, which is an important implementation criterion. At each site, the project objective was exceeded.

Table 2 – Effective Ground Cover, Project Object and Measured, for Prescribed Fire Sites

Sample site	Effective ground cover: Project objective	Effective ground cover: Measured
Hill 23 Unit 6	60%	94%
Hill 23 Unit 7	60%	99%
Hill 23 Unit 13	60%	98%
Timber Gulch unit	60-70%	87%
Homestead unit	50%	98%

Minerals Management Activities

M27 Common Variety Minerals (1 site)

The sample site was a pit used to generate aggregate for two road projects (Bowerman and Gronchi Stormproofing). The pit is not near a stream, so many of the criteria are not applicable. The site was benched as per OSHA requirements, and access roads were waterbarred. Currently, the site is in

"restored" status. The evaluation indicated that the operation had fully met all BMP Implementation and Effectiveness requirements.

Vegetation Management Activities

V28 Vegetation Manipulation (3 sites)

Two mastication units on Salmon River Ranger District, Salmon Bug Mastication Project Units 1 and 9, and one tractor piling unit on Five Points Timber Sale, also on Salmon District were sampled. **All three met BMP Implementation and Effectiveness criteria at a level adequate to "pass", although the Five Points tractor pile unit fell slightly short of the ground cover criteria.** The following table summarizes the measured and project objective values for each unit.

Table 3 – Effective Ground Cover, Project Object and Measured, for Veg Manipulation Sites

Sample site	Effective ground cover: Project objective	Effective ground cover: Measured
Salmon Bug Mastication, Unit 1	70%	85%
Salmon Bug Mastication, Unit 9	80%	83%
Five Points Timber Sale Unit 56 tractor piling	70%	67%

Table 4. Summary of 2007 BMP Implementation and Effectiveness Success Rate by Individual BMPs. (Randomly sampled sites only)

BMP	Total # of Sites	IMPLEMENTATION		EFFECTIVENESS	
		# of Sites Meeting BMP Criteria	% of Total	# of Sites Meeting BMP Criteria	% of Total
T01	4	4	100	4	100
T02	2	2	100	2	100
T03	4	4	100	4	100
T04	7	7	100	7	100
E08	3	3	100	3	100
E09	4	4	100	4	100
E10	4	4	100	4	100
E11	3	3	100	3	100
E13	4	4	100	4	100
E14	1	1	100	1	100
E16	1	1	100	0	0
E19	1	1	100	1	100
R22	1	1	100	1	100
R30	2	2	100	2	100
G24	5	5	100	5	100
F25	5	5	100	5	100
M27	1	1	100	1	100
V28	3	3	100	3	100
Totals	56	56	**100%**	55	**98%**

SUMMARY OF NON-RANDOM SITE EVALUATIONS

1. Evaluation of road stormproofing with fill lowering component

The stormproofing of Road 46N66 involved outlsloping, fill reduction, and reduction of diversion potential. High stream flows of 2005-2006 did not cause any large diversions as occurred on this road in 1997. However, partial removal of large granitic fills on this road led to much more gully erosion and small shallow debris sliding than had been expected during the planning process. This was due to several factors: a) the excavated surface of the fill was left in a very steep configuration (locally 80%); b) lowering of the road grade created a low spot which received road water from both directions, and directed this water on to the newly exposed surface of the fill; c) faint ruts in the road bed created by winter use allowed water to travel down the road rather than exiting along the outslope. These problems were duly noted during field reviews by watershed and engineering personnel, and will be prevented on similar projects in the future by: a) assuring that partially excavated granitic fills are are much gentler (1¼:1 to 1½ :1); b) providing effective buttressing and armoring (such as a rock material lain over filter fabric). Another problem which occurred on this road involved two small debris slides (about 10 cubic yards) which developed below the road in old fill material. These slides were triggered by local concentration of road water traveling down faint wheel ruts in the road. This problem will be difficult to prevent completely on future outsloping projects. Even when good rock is placed on such roads, winter traffic can still produce faint wheel ruts. Though these ruts do not develop into gullies, they can carry water for a considerable distance down the road. This potential should be considered whenever outlsoping or fill reduction is planned on non-paved roads carrying winter traffic, particularly in granitic areas. In 2007, the Forest Service road crew placed pit-run rock on these eroding fills to mitigate erosion.

2. Wet Weather Operations

In fall of 2006 one timber sale was operating on Goosenest Ranger District (Tamarack). In January another sale began operations, also on Goosenest (Goosenest LSR). The sales shut down once the soil began to thaw. Evaluations were done at least weekly to confirm that BMPs were effective at controlling discharges and protecting the road investment. In the spring and summer of 2007, there was roadside logging on one sale (Kelly Blowdown). Resource damage was prevented by timely shut down of operations. Several other sales (Bacon Rind, Jack Conventional and Colestine) were shut down in Fiscal Year 2007. Another sale (Tennis Thin) only had ongoing roadwork. In the fall of 2007, as of this report, there are a number of active sales on the Goosenest District that are located in areas that produce little surface runoff and have few beneficial uses of water. The Fiscal 2008 BMP Report will give results of BMP evaluations of these operations. Appendix B gives a detailed list of wet weather operations and evaluations during Fiscal Year 2007.

ADAPTIVE MANAGEMENT DISCUSSION AND CONSIDERATIONS

The following discussion is divided into 1) practices that are working well, 2) practice applications that can be improved, 3) practices to consider for possible modification at the Forest level, and 4) Oracle database problems that need fixing at the Region.

1. Practices that are working well

Most of the 17 activities evaluated in 2007 met BMP compliance and were effective at controlling nonpoint pollution. These included all timber sale activities; all vegetation, fire, minerals management activities, and recreation sites; and most road engineering activities. Management should continue to use these practices on all future projects.

The inchannel practice (E13) showed a marked improvement. The 2006 report said that in recent years "the major implementation problems are associated with not adequately removing excavated/stockpiled materials from the channel and/or floodplain (5 failures). The second reason was the requirements for dewatering/diversion of flow were not met (3 failures). The third reason was that the disturbed channel was not returned to natural or the designed grade (1 failure)." There weren't fish passage projects in 2007 as there were in recent years. These are technically very challenging projects because of the size of the streams, the difficulty in diverting flow and in finding stockpiling locations for excavated materials. However, in 2007 there was one perennial stream crossing reconstruction similar to fish passage retrofitting, plus 3 retaining walls on lower Horse Creek which presented the challenge of excavating below streambed levels. Water quality and habitat protection needs were carefully considered throughout project planning and implementation, ensuring that BMPs were fully met.

2. Practice applications that can be improved

The 2007 project BMPs were largely implemented as planned and effective. For a few practices, effectiveness could be improved even further.

Stormproofing on granitic parent material

Partial removal of large granitic fills on the non-randomly sampled road (described on page 14) led to much more gully erosion and small shallow debris sliding than had been expected. The problems were due to concentration of flow and oversteepened surface remaining once the fill was excavated. Concentration of flow can be mitigated by effective buttressing and armoring (such as a rock material lain over filter fabric or erosion fabric). Oversteepened excavated face can be readily improved by designing partially excavated granitic fills that have much gentler slopes (1¼:1 to 1½ :1). Traffic during wet weather leads to ruts that result in concentration of exiting road drainage in unintended locations. This can happen on any road during wet conditions. In some cases this can be prevented with seasonal closures; however, when roads must remain open during winter, efforts by management to increase public and employee awareness may help. This potential should be considered whenever outlsoping or fill reduction is planned on non-paved roads carrying winter traffic, particularly in granitic areas.

E10 Road Decommissioning

The 2006 evaluation of this practice indicated that minor problems such as inadequate road closure obstruction, incomplete removal of fill material where culverts were removed, and restoring channel gradient to something other than natural gradient occurred. Some of these problems, such as incomplete removal of fill material were observed on the road sites visited in 2007. The sample pools of decommissioned roads evaluated in 2006 and 2007 are of similar vintage, and share these problems.

Closer inspection by engineering and earth science staff would help rectify these issues before final project acceptance and contract closure.

E14 Temporary Roads

The temporary road sampled in 2007 is not thought to be typical regarding pipes left in. This road should be either upgraded (stream crossings brought up to standard) and placed on the transportation system, or decommissioned to be consistent with Forest Service Road Management Policy. If the intent is to keep it off the system and only use it periodically as a temporary road, the culverts should be removed. District timber and fire management staff should advise the decision maker about long term needs for the road. It's a watershed risk that can be eliminated, and the Forest should add the road to its decommissioning or stormproofing program as appropriate.

3. Practices to consider for possible modification at the Forest level

E 10 Road Decommissioning

Limiting rock armoring to only culvert outlets may be less effective than armoring all channels on a road restoration project. An interdisciplinary team of an earth scientist, fish biologist and engineer should develop Forest wide criteria for use of riprap which would lead to better project consistency. A review of the "design test" by the 2006 flood flows is recommended on decommissioned crossings may provide a learning opportunity that can result in better decommissioning designs. Similar evaluations of stormproofing projects post 1997 was done by Elder in 2003. This opportunity should be considered for the 2008 season.

G24 Grazing

Grazing over-utilization of riparian areas is a concern for water quality and beneficial uses. Even though sites passed implementation and effectiveness criteria overall, range management situations reported in 2006 included localized trampling of meadows and streambank areas. This was seen on some of the 2007 samples as well. On one of these sites, a draft management decision was released to the public in 2007 that would reduce the number of cattle to half. In this same decision, for another allotment (not BMPEP monitored in 2007) it was proposed to not renew the grazing permit in order to allow restoration of the meadow ecosystem. On other allotments that were sampled in 2007, recommendations made include moving salt blocks to reduce trailing in riparian areas. These are all examples of adaptive management that is working.

The 2006 report mentioned that the Forest lacks site specific water quality and riparian standard and guidelines. The G24 evaluation protocol is structured as if such a standard is already in place on each Forest. This makes the implementation rating "not applicable" by default. In 2002, Forest range staff began formulating objectives for streambank disturbance and woody plant utilization on allotments that have vulnerable stream channels. This has been gradually occurring as permits come due for renewal. It is unknown whether these objectives are consistent with what is being formulated on other forests, or even from permit to permit on this forest. In September 2005, a proposal was made by Forest fisheries, soils, and hydrology staff to revise the Forest Plan to include a grazing standard and guideline for streambank disturbance that is a consistent and effective practice. The proposal is being reviewed by range management and Forest planning staff and could be incorporated in the upcoming Forest Plan Revision. As a next step, in August 2007 the Forest Hydrologist, Fisheries and Endangered Species Program Manager, Goosenest Range Conservationist, Region 5 Hydrologist and R5 Acting Range Program Manager conducted a field trip to a Goosenest range allotment to look at various options for measuring streambank alteration using more meaningful metrics than the current BMPEP criterion. Use of stubble height and rooting depth of herbaceous riparian vegetation were two options they discussed. At the present time, the G24 protocol is being redesigned at the Regional and National level by interdisciplinary teams grappling with the same issues. It is recommended that these broader monitoring design processes be tracked by Forest planning, range, fisheries and watershed staff with the goal the of coming up with a standard and guideline for the Forest Plan revision. The standard and guide should be meaningful for assessing water quality protection in KNF rangeland settings, and measurable in a way that is simple and repeatable.

4. Improvements to software needed at the Regional level

The scoring of R22 implementation and effectiveness are currently set so that a single criterion receiving a moderate rating will cause the site to fail either stage. According to the database architect and steward, this is inconsistent with the scoring pattern of the other BMPEP protocols. The Regional Office has committed to fixing this glitch prior to next monitoring season.

CONCLUSIONS AND CONSIDERATIONS

In 2007, implementation standards for BMPs were fully compliant on all evaluated sites. BMP effectiveness requirements were met on 98% of the sites evaluated. This represents a very slight change from 2006. Further improvement in BMP implementation is needed in road decommissioning practices (E10). While not typical of most temporary roads currently being used on the Forest, the one evaluated in 2007 for temporary road BMP compliance, E14, involves permanent culverts in streams. This warrants special attention by Watershed and Engineering staff.

The majority of practices evaluated in 2007 were highly successful, owing to management's commitment and the training and experience of project planners and implementers. This needs to be encouraged in order to continue the Forest's BMP successes. Suggestions made in the Adaptive Management discussion can improve BMP performance even further.

REFERENCES

USDA, Forest Service, 2002, Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide, USDA, Forest Service, Pacific Southwest Region.

Appendix A. BMP Evaluation Procedure Names and Descriptions.

Procedure #	*Procedure Name (BMPs Monitored)*
T01	Streamside Management Zones* (BMP 1.8, 1.19, 1.22)
T02	Skid trails (BMP 1.10, 1.17)
T03	Suspended yarding (BMP 1.11)
T04	Landings (BMP 1.12, 1.16)
T05	Timber sale administration (BMP 1.13, 1.20, 1.25)
T06	Special erosion control and revegetation (BMP 1.14, 1.15)
T07	Meadow protection (BMP 1.18, 1.22, 5.3)
E08	Road surface, drainage and slope protection (BMP 2.2, 4, 5, 10, 23)
E09	Stream crossings (BMP 2.1)
E10	Road Decommissioning (BMP 2.26)
E11	Control of side cast material (BMP 2.11)
E12	Servicing and refueling (BMP 2.12)
E13	In-channel construction practices (BMP 2.14, 2.15, 2.17)
E14	Temporary roads (BMP 2.16, 2.26)
E15	Rip rap composition (BMP 2.20)
E16	Water source development (BMP 2.21)
E17	Snow removal (BMP 2.25)
E18	Pioneer road construction (BMP 2.3, 2.8, 2.9, 2.19)
E19	Restoration of borrow pits and quarries (BMP 2.27, 2.18)
E20	Management of roads during wet periods (BMP 2.24, 7.7)
R22	Developed recreation sites (BMP 4.3, 4, 5, 6, 9, 10)
R23	Location of stock facilities in wilderness (BMP 4.11)
G24	Range management (BMP 8.1, 8.2, 8.3)
F25	Prescribed fire (BMP 6.3)
M26	Mining operations (Locatable minerals) (BMP 3.1, 3.2)
M27	Common variety minerals (BMP 3.3)
V28	Vegetation manipulation (BMP 5.1, 5.2, 5.5, 5.7)
V29	Revegetation of surface disturbed areas (BMP 5.4)
R30	Dispersed Recreation Sites (BMP 4.5, 4.6, 4.10)

Appendix B Non-Random BMP Monitoring

FY 07 Season Notes
Wet Weather Operations BMP Monitoring
T05 Timber Operations and E20 Management of Roads during Wet Periods

Documentation of monitoring is found in timber sale contract folders in *BMP – WWO Seasonal Report Tables* and *SF 181 (Contract Daily Diary)* referenced by its file number in the table.

Status of operations, open timber sales – Fall 2006

- **Pomeroy – no operations**
- **Erickson – no operations**
- **Whaleback – no operations**
- **Sheep Rock – no operations**
- **South Plantation - no operations**

Status of operations, open timber sales – Spring/Summer 2007

- **Indian Scotty – closed**
- **Robinson Flat – closed**
- **Bacon Rind – shut down**
- **Jack Conventional – shut down**
- **Colestine – shut down**
- **Tennis Thin – road work only**
- **Adam – closed**
- **Kelly Blowdown – roadside logging**

Table summarizing Wet Weather Operations and related BMP monitoring

Project	**WWO standards/BMPs and/or monitoring done**	**Reference source (year and number-for-year of SF 181)***
Tamarack Timber Sale	11/27: snow on road, plowed to 2” depth. Meets BMP	BMP-WWO Seasonal Report
	12/7: waterbars checked on Units 7 and 22; meet BMPs	BMP-WWO Seasonal Report
	12/12: snow on road. Haul shut down on main road due to melt. No equipment allowed on spur road until refreeze or drying (ruts)	BMP-WWO Seasonal Report
	12/19: snow. System road and spur plowed and frozen	BMP-WWO Seasonal Report
	1/16: packed snow; frozen. Log haul continues	BMP-WWO Seasonal Report
Goosenest LSR Timber Sale	1/10: packed snow; frozen. Log haul continues	BMP-WWO Seasonal Report
	1/22: snow. Road frozen solid	BMP-WWO Seasonal Report

	1/25: Thaw. Road haul stopped at 12 AM per engineer's input	BMP-WWO Seasonal Report
	2/15: system road and temp spur evaluated. Rain and runoff. Waterbars and dips are effective; roads meet BMP	BMP-WWO Seasonal Report
Adam Timber Sale	Waterbars installed on skid trails and landings bladed to drain	2007 - #07
Kelly Blowdown Timber Sale	No erosion measures necessary; roadside logging	
Robinson Flat Timber Sale	Roads and skidtrails back-bladed to drain and pasture harrowed	2007 - #06
Boulder Pile Timber Sale	Designated skid trail water bars and drain outs. Slash spread where logs pulled upslope	2007 - #01
Indian Scotty Timber Sale	3/20: culvert drainage evaluated; no water leaving road. Sale area evaluated.	BMP-WWO Seasonal Report
	3/26: sale area evaluated; no operations due to rain	BMP-WWO Seasonal Report
	3/27: log haul but no skidding (snow)	BMP-WWO Seasonal Report
Bacon Rind Timber Sale	Erosion control kept current with operations	2007 - #05
	Too wet to haul. Shut down all operations except handpiling	2007 - #07
	Felling active. No haul (roads wet)	2007 - #10
	No operations 5/1/07-5/7/07	2007 - #11
Jack Conventional Timber Sale	3/22: 40N75 road conditions moist but firm. Weather clear and warm.	BMP-WWO Seasonal Report
	3/26: light rain. Evaluated 40N75	BMP-WWO Seasonal Report
	3/27: light snow. Ground conditions stable. May open 40N75 and spur	BMP-WWO Seasonal Report
	3/28: clear and sunny	BMP-WWO Seasonal Report
	4/2: 40N75 is dry. Began haul	BMP-WWO Seasonal Report
	4/10: snow/rain. 40N26B is damp, but meets BMPs	BMP-WWO Seasonal Report
	5/2: Hail. 41N16 is moist but firm. No sediment movement; meets BMPs	BMP-WWO Seasonal Report
	5/9: evaluated haul roads. Dry conditions. Recommended haul	"

	route be bladed	
	7/10: sale terminated until later date	“
Colestine Stewardship	10/1: evaluated unit 5; rained night before. Contractor shut down operations	“
	10/4: No haul; pick-up traffic only. Roads slippery.	“
	10/9: No haul; pick-up traffic only due to rain	“
	10/15: aggregate placed on wet area for drainage	“
	10/16: operations terminated due to rain and snow	“
	10/23: Recommense haul on 40S27. No skidding	“
	11/9: terminate haul and shut down operations for winter. Roads bladed and waterbarred	“
Goosenest LSR Timber Sale (facility resource concerns)	10/10: rain. Fuel site met BMP	“
	10/19: haul route met BMP. Spread straw at culvert outlet	“
	10/23: landing H4 meets BMP, but temp spur L5 didn’t. Corrective action taken	“
	10/25: suspended haul on 3 roads. landing H4 meets BMP	“
	10/26 and /29: landing meets. On 10/29 ruts seen on temp spur; suspended haul. On 10/31 spot rocked spur and main roads rocked after wet material removed	“
	11/3: roads in good shape	“
	11/6: purchaser suspended haul on 2 roads. 46N05 haul continued; road holding up well.	“
	11/13: purchaser suspended operations	“
	11/15: cleared road and suspended haul	“
	11/26 and /27: road is frozen and meets BMP. Recommense haul	“
Cold Creek Timber Sale	11/29/06: evaluated haul route. Roads frozen and OK	“

	2/5/07: evaluated haul route. Purchaser only moving equipment in the morning when road is frozen	“
	3/12/07: evaluated haul route. Wet roads. Purchaser shut down operations	“
	5/8/07: evaluated haul route. Purchaser to monitor roads	“
	11/5/07: evaluated sale area. Rainy. Operations shut down by Purchaser	“

*** Except where other source is given**

Appendix C – Comparison of Evaluation Accomplishment with Target for KNF

Evaluations were accomplished for a total of 57 sites, using 17 protocols to assess timber, engineering, recreation, grazing, fire, vegetation manipulations and minerals management. The Klamath had a target of 61 sites using 26 protocols. **Shortfalls occurred in these protocols:**

T02 - 2 of the assigned 5 were done

T04 - 1 of 3 were done

T05 - neither of the 2 were done because there were no active timber sales meeting the criteria)

T06 - the 2 assigned were not done because no projects met sample pool criteria.

T07 - same as for T06 except target was 2.

E11 – 2 of the 3 were done.

E12 – 1 assigned but not done

E16 – 1 of the 2 assigned was done.

E17 - these three were agreed by the Regional Office to drop as a KNF target because of sample bias due to virtually the entire sample pool comprised of roads with no associated water quality risks. Recommend the same for 2008 target.

E20 - a non-random, concurrent sample of wet weather ops was done beyond the BMPEP program because the small sample of problem sites (1 in 2007) leads to misleading (non-representative) results.

M26 - the 2 assigned samples weren't done because the staff members needed for the evaluations were unable to coordinate their calendars.

V29 - the 2 assigned sample wasn't done because no pool was established and sites were not pre-picked.

The KNF exceeded the target in these protocols:

T03 – 4 sites instread of the assigned 2

E13 - 4 sites instread of the assigned 2

R22 - 2 sites instead of the assigned 1. One of the two sites will be reported in 2008 because there is an apparent glitch in scoring R22 which will be repaired by the Regional Office.

G24 – 5 sites evaluated instead of the 3 assigned.